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10/691,555	10/24/2003	David C. Lovetro		7490

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EXAMINER

CARRILLO, BIBI SHARIDAN

ART UNIT PAPER NUMBER

1746

DATE MAILED: 12/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/691,555

Applicant(s)

LOVETRO ET AL.

Examiner

Sharidan Carrillo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 October 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 8-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 8-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claim 23 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The limitations of contacting the metal with said solution for a time sufficient to effect cleaning and less than an amount of time to effect etching constitutes new matter, not supported by the specification as originally filed. Page 3, lines 23-24 of the instant specification teach that in the cleaning process of the invention only small amounts of metal is dissolved. Page 3, line 23 states that with etching amounts of metal are dissolved. Based on page 3, lines 23-24, the instant specification teaches that during the cleaning process, etching occurs which results in the metal being dissolved. The specification does not teach a solution which effects cleaning and less than an amount of time of effect etching. The specification does not teach or suggest the amount of time to effect cleaning or the amount of time to effect etching. Therefore, the limitations of claim 23 constitute new matter.

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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3. Claim 23 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 23 is indefinite because it is unclear what one would consider as a time which is sufficient to effect cleaning but less than a time to effect etching. Additionally, it is unclear what is being etched. Additionally, how is the cleaning and etching effected. Specifically, how much is being etched or cleaned? What does applicant mean by "effect cleaning and effect etching"?

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-6, 8, 12, and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brasch (43782270).

In reference to claims 1-2 and 12, Brash teaches a method of etching copper from a circuit board by contacting with an aqueous solution comprising hydrogen peroxide, at least one mineral acid (sulfuric acid) and 0.1-20% by weight phosphonic acid (col. 3, lines 25-30, col. 4, lines 17-20, col. 2, lines 35-40). In reference to cleaning metals, the limitations are met since Brasch is performing the same step of contacting the metal with the claimed composition. Additionally, since "etching" and "cleaning" are equivalent terms, the limitations are met since during the etching of the copper metal, contaminants are removed from the copper surface. Brasch fails to teach the pH of less than 7, as recited in claims 1, and 17-18. One would have reasonably expected the pH of the composition to be less than 7 since the pH is a chemical property of the composition and Brasch teaches the same composition as the instantly claimed invention. Additionally, one would have reasonably expected the pH of the composition

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to be less than 7 since the prior art teaches that compositions comprising hydrogen peroxide, surfactant, and phosphonic acid having pHs of less than 7 (Jadesjo et al., 5885953). In reference to claim 2, refer to col. 3, lines 25-30. In reference to claims 4-5, refer claim 9 of Brasch. In reference to claim 6, Brasch fails to teach the claimed concentration of hydrogen peroxide. However, in col. 4, lines 19-20, Brasch teaches that lower concentrations of hydrogen peroxide can be employed. In reference to claim 8, refer to col. 2, line 30.

7. Claims 9, 13-14, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brasch (4378270) in view of Schellinger Jr. (4401509).

Brasch teaches the invention substantially as claimed with the exception of the concentration of sulfuric acid. Schellinger teaches a composition for etching copper from circuit boards using sulfuric acid, hydrogen peroxide, and phosphonic acid. In col. 3, lines 3-5, Schellinger teaches 2-20% sulfuric acid. Schellinger further teaches that the concentration of sulfuric acid is not critical.

It would have been obvious to a person of ordinary skill in the art to have modified the method of Brasch to include adjusting the concentration of sulfuric acid to 2-20%, as taught by Schellinger, for purposes of etching copper from integrated circuit boards.

Brasch, as modified by Schellinger, fail to teach 35-50% of phosphonic acids. However, it would have been within the level of the skilled artisan to adjust the concentration of phosphonic acid since Brasch teaches that higher concentrations can be used (col. 3, lines 25-30). In reference to claim 14, refer to the teachings of Brasch.

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In reference to claims 19-20, one would have reasonably expected the pH of the composition to be less than 7 since the pH is a chemical property of the composition and Brasch teaches the same composition as the instantly claimed invention.

Additionally, one would have reasonably expected the pH of the composition to be less than 7 since the prior art teaches that compositions comprising hydrogen peroxide, surfactant, and phosphonic acid having pHs of less than 7 (Jadesjo et al., 5885953).

8. Claims 10-11, 15-16, and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brasch (4378270) in view of Sugihara et al. (5705089).

In reference to claims 10-11, and 15, Brasch teaches the invention substantially as claimed with the exception of the surfactant. Sugihara teaches an acidic or basic solution comprising hydrogen peroxide, surfactant, sulfuric acid, and phosphonic acid for cleaning semiconductor substrates in order to remove metallic contaminants. In col. 3, lines 60-65, Sugihara teaches a nonionic surfactant as a wetting agent for purposes of enhancing removal of contaminants from the substrate surface. It would have been obvious to a person of ordinary skill in the art to modify the method of Brasch to include nonionic surfactants of Sugihara, as a wetting agent, for purposes of enhancing removal of contaminants from the substrate surface. In reference to claim 16, refer to the teachings of Brasch. In reference to claims 21-22, one would have reasonably expected the pH of the composition to be less than 7 since the pH is a chemical property of the composition and Brasch teaches the same composition as the instantly claimed invention. Additionally, one would have reasonably expected the pH of the composition to be less than 7 since the prior art teaches that compositions comprising

hydrogen peroxide, surfactant, and phosphonic acid having pHs of less than 7 (Jadesjo et al., 5885953).

9. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brasch (43782270) in view of Cooper et al. (6063205).

In reference to claim 23, Brash teaches a method of etching copper from a circuit board by contacting with an aqueous solution comprising hydrogen peroxide, at least one mineral acid (sulfuric acid) and 0.1-20% by weight phosphonic acid (col. 3, lines 25-30, col. 4, lines 17-20, col. 2, lines 35-40). In reference to step b of claim 23 and in view of the indefiniteness with respect to the time and what is being etched, the limitations are met by Brasch. In reference to cleaning metals, the limitations are met since Brasch is performing the same step of contacting the metal with the claimed composition. Additionally, since "etching" and "cleaning" are equivalent terms, the limitations are met since during the etching of the copper metal, contaminants are removed from the copper surface. Brasch fails to teach the claimed concentration of hydrogen peroxide. However, in col. 4, lines 19-20, Brasch teaches that lower concentrations of hydrogen peroxide can be employed. In reference to claim 8, refer to col. 2, line 30. Brasch fails to teach passivating the metal by contacting with the hydrogen peroxide solution. However, one would have reasonably expected passivating to occur since Brash is performing the same step of contacting the metal with the claimed composition. Alternatively, it is well known in the art, as evidenced by Cooper et al., that treating a surface (i.e. semiconductor wafer) with hydrogen peroxide results in both cleaning of the surface and passivation of the substrate surface (col. 3,

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lines 35-40). Therefore, given the teachings of Cooper et al., one would have reasonably expected the step of contacting the surface with hydrogen peroxide solution to also result in passivation of the substrate surface since Cooper et al. teach hydrogen peroxide as a cleaning and passivating agent. Additionally, it is well known and conventional in the art to clean contaminants from the substrate surface and passivate the surface using hydrogen peroxide (Chai et al., 5837662).

10. Claims 1-6, 8, 10-12, 15-18, and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugihara et al. (5705089).

Sugihara et al. teach an acidic or basic cleaning solution for cleaning a semiconductor substrate in order to remove metal contaminants, the solution comprising hydrogen peroxide, sulfuric acid, nonionic surfactant, and phosphonic acid (col. 3, lines 50-65).

In reference to claims 1-3, and 15, Sugihara fails to teach the claimed concentration of phosphonic acid. Col. 3, lines 50-51 teaches that the amount of phosphonic acid is not limited. Therefore, it would have been obvious and within the level of the skilled artisan to adjust the concentration of phosphonic acid as needed in order to remove the contaminants from the metal surface, since Sugihara teaches that any desired concentration level can be used. In reference to the pH and claims 1, 15, 17-18 and 21-22, one would have reasonably expected the pH to be less than 7 since Sugihara teaches an acidic cleaning solution. In reference to claims 4-5 and 16, refer to col. 3, lines 30-45. In reference to claim 6, refer to col. 5, lines 15-17. In reference to claim 8, refer to col. 3, lines 50-57. In reference to claims 10-11, refer to col. 3, lines 60-

65. In reference to claim 12, refer to Table 1 of Sugihara.). In reference to cleaning metals, the limitations are met since Sugihara teaches cleaning a semiconductor substrate by performing the same step of contacting the metal with the claimed composition. Additionally, during the removal of the copper metal from the substrate surface the limitations are further met since contaminants are removed from the copper surface during the contacting step.

11. Claims 9, 13-14, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugihara et al. (5705089) in view of Schellinger Jr. (4401509).

Sugihara teaches the invention substantially as claimed with the exception of the concentration of sulfuric acid. Schellinger teaches a composition for etching copper from circuit boards using sulfuric acid, hydrogen peroxide, and phosphonic acid. In col. 3, lines 3-5, Schellinger teaches 2-20% sulfuric acid. Schellinger further teaches that the concentration of sulfuric acid is not critical.

It would have been obvious to a person of ordinary skill in the art to have modified the method of Sugihara to include adjusting the concentration of sulfuric acid to 2-20%, as taught by Schellinger, for purposes of cleaning the substrate surface.

In reference to claim 13, Sugihara fails to teach the claimed concentration of phosphonic acid. Col. 3, lines 50-51 teaches that the amount of phosphonic acid is not limited. Therefore, it would have been obvious and within the level of the skilled artisan to adjust the concentration of phosphonic acid as needed in order to remove the contaminants from the metal surface, since Sugihara teaches that any desired concentration level can be used. In reference to claim 14, refer to col. 3, lines 30-50 of

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Sugihara. In reference to claims 19-20, one would have reasonably expected the pH of the composition to be less than 7 since the pH is a chemical property of the composition and Sugihara teaches an acidic solution.

12. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sugihara et al. (5705089) in view of Cooper et al. (6063205).

Sugihara et al. teach an acidic or basic cleaning solution for cleaning a semiconductor substrate in order to remove metal contaminants, the solution comprising hydrogen peroxide, sulfuric acid, nonionic surfactant, and phosphonic acid (col. 3, lines 50-65). In reference to step b of claim 23 and in view of the indefiniteness with respect to the time and what is being etched, the limitations are met by Sugihara.

Sugihara fails to teach the claimed concentration of phosphonic acid. Col. 3, lines 50-51 teach that the amount of phosphonic acid is not limited. Therefore, it would have been obvious and within the level of the skilled artisan to adjust the concentration of phosphonic acid as needed in order to remove the contaminants from the metal surface, since Sugihara teaches that any desired concentration level can be used. In reference to cleaning metals, the limitations are met since Sugihara teaches cleaning a semiconductor substrate by performing the same step of contacting the metal with the claimed composition. Additionally, during the removal of the copper metal from the substrate surface the limitations are further met since contaminants are removed from the copper surface during the contacting step.

Sugihara fails to teach passivating the metal by contacting with the hydrogen peroxide solution. However, one would have reasonably expected passivating to occur

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since Sugihara is performing the same step of contacting the metal with the claimed composition. Alternatively, it is well known in the art, as evidenced by Cooper et al., that treating a surface (i.e. semiconductor wafer) with hydrogen peroxide results in both cleaning of the surface and passivation of the substrate surface (col. 3, lines 35-40). Therefore, given the teachings of Cooper et al., one would have reasonably expected the step of contacting the surface with hydrogen peroxide solution to also result in passivation of the substrate surface since Cooper et al. teach hydrogen peroxide as a cleaning and passivating agent. Additionally, it is well known and conventional in the art to clean contaminants from the substrate surface and passivate the surface using hydrogen peroxide (Chai et al., 5837662).

Response to Arguments

13. Applicant argues that none of the prior art references teach passivation of a metal. The secondary references of Cooper and Chai et al. are relied upon to teach the deficiency. Additionally, the dual function of hydrogen peroxide as a cleaning and passivating agent is notoriously well known in the art as evidenced by Armentano, Crotty, Wilmotte et al., and Giordani et al.

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Grenspan and Willard teach stabilizers for hydrogen peroxide.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharidan Carrillo whose telephone number is 571-272-

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1297. The examiner can normally be reached on M-W 6:30-4:00pm, alternating Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571-272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sharidan Carrillo
Primary Examiner
Art Unit 1746

bsc



SHARIDAN CARRILLO
PRIMARY EXAMINER